

ND commissioning procedure (Initial Steps)

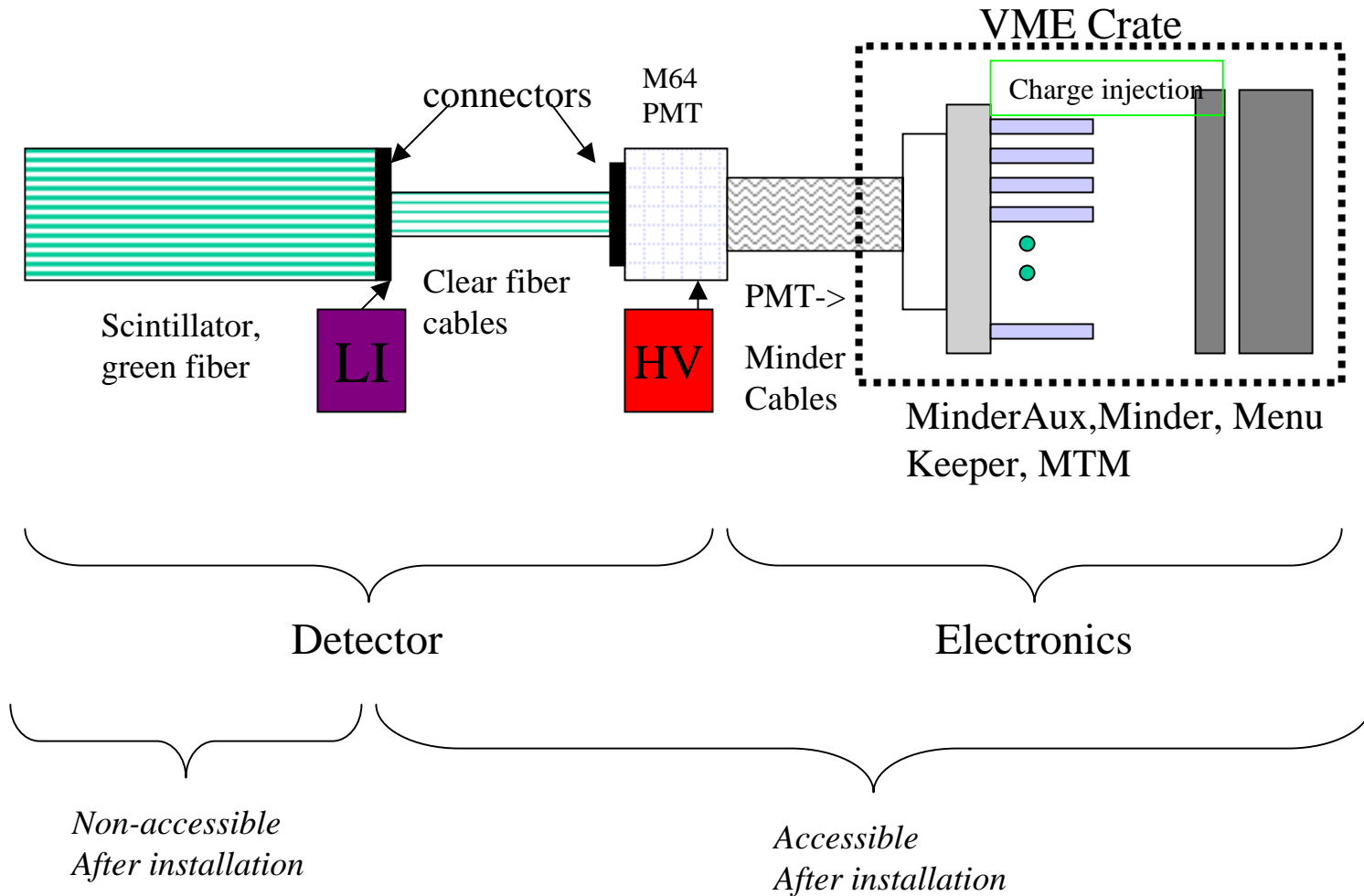
N. Saoulidou 06-17-04

Plane Instrumentation & Data taking

- Procedure:
 - Planes Cabled.
 - Planes Light leak checked.
 - Alner box end is light leak tested
 - The LI end is light leak tested as well.
- At the end of the day we take runs for
 - Pedestals
 - QIE Calibration checks
 - Null trigger with lights ON and OFF.

Detector schematic

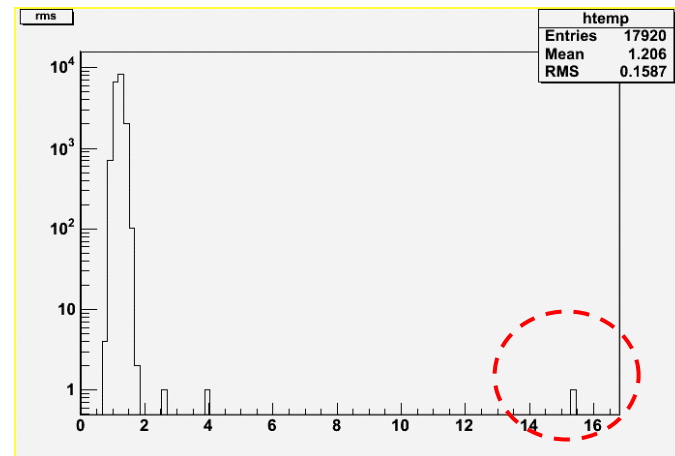
- Gina made a nice schematic of the detector subsystems:



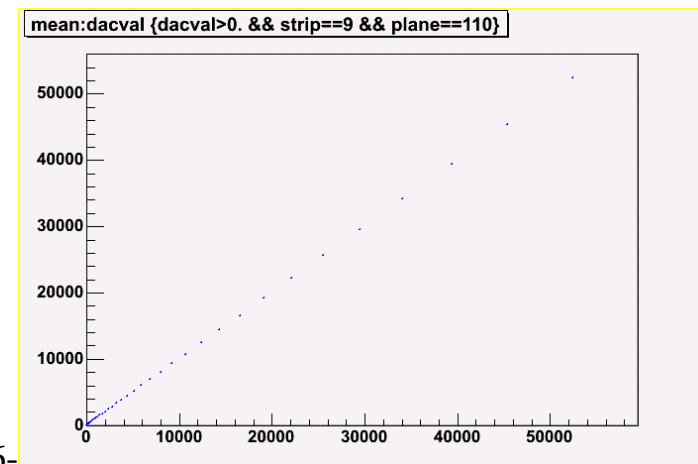
Pedestals & QIE calibration

- **Pedestals should be**
 - Stable and (need to perform study at the end of the week with all Pedestal runs?)
 - Show small RMS (check every day.
- **QIE response in charge injection runs should be:**
 - Stable (need to perform study at the end of the week with all NCC runs)
 - Show small RMS (check every day)
 - Show Linear response (check every day)
 - Have no missing entries (256 is the nominal number of entries)
 - Have no missing points (37 is the nominal number of points)

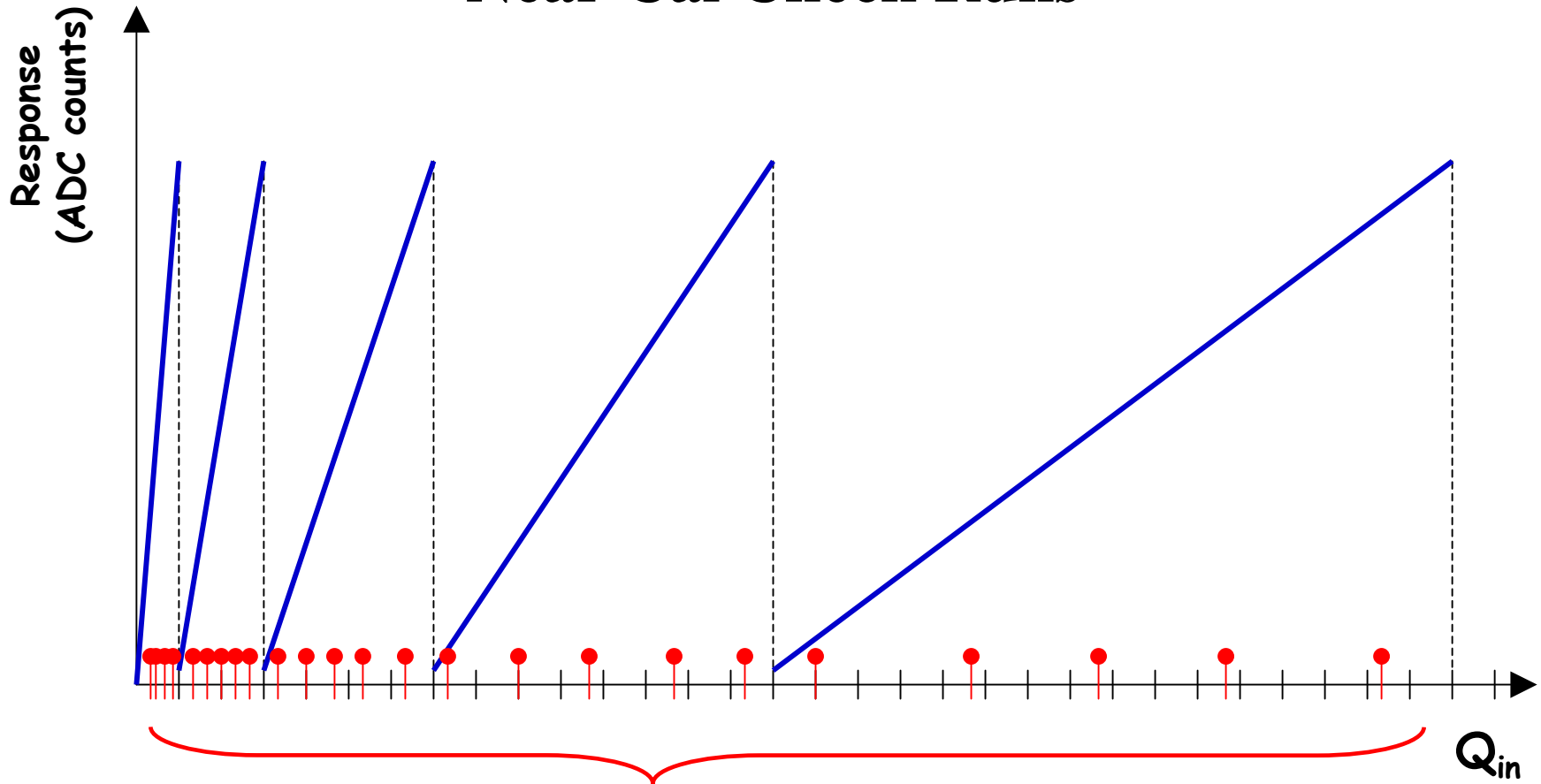
RMS 's for channels that read the V planes 118 & 120



Mean vs DAC value for a healthy channel



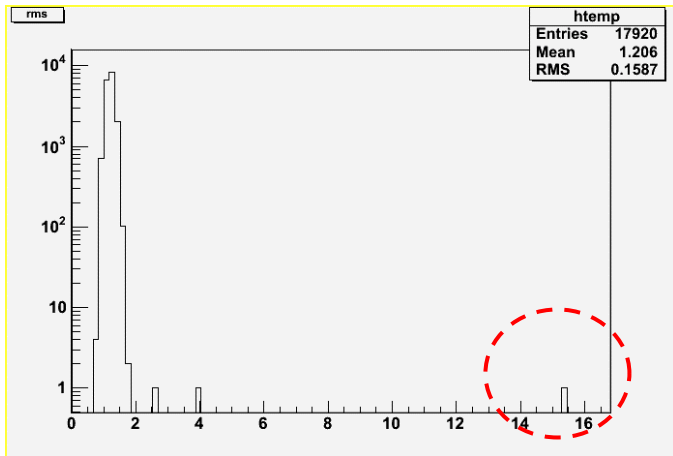
Near Cal Check Runs



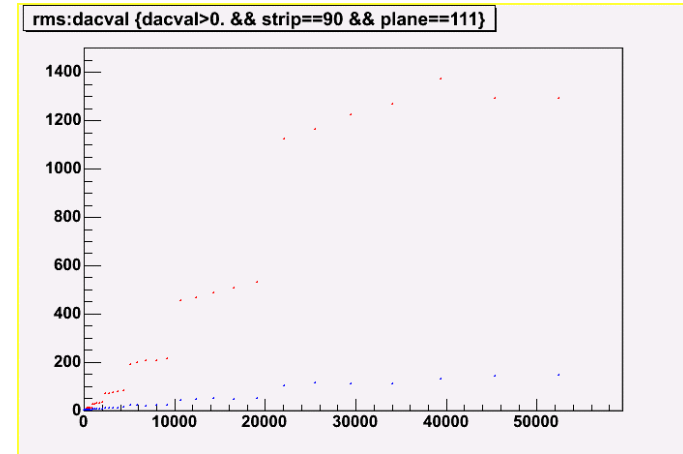
- In the Near Cal Check Runs the DAC is swept through a range of values (37 in total which correspond in ~ 5 points for each different QIE range) and the QIE response (in ADC counts) is calculated using the previously loaded Look-Up-Tables.
- This way both the QIE Calibration and the QIE response characteristics can be examined.

Pedestals & QIE calibration PATHOLOGIES

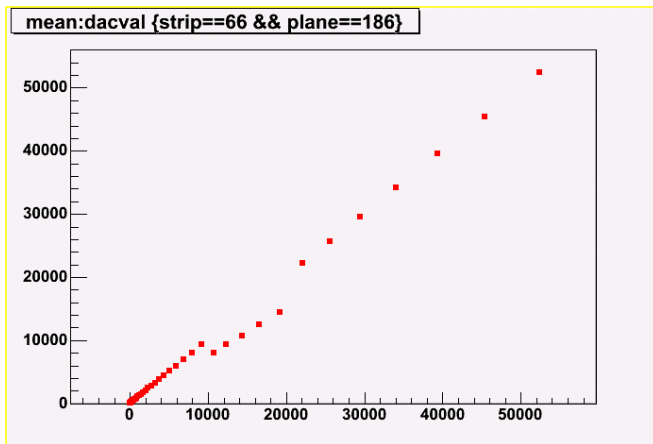
Pedestals Large RMS



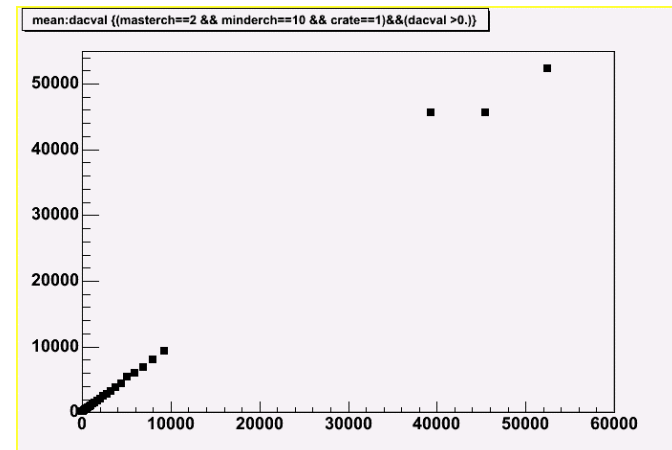
QIE Large RMS



QIE Non Linearity



QIE Missing Data Points



“Bad” QIE channels

- Use modified the QieCalibration Module (initial code by S.Murgia, current code includes all my analysis on QIE response) that generates (apart from the tree) 5 text files :

- bad_channels_rmsxx.dat	Large RMS in most 37 DAC values
- suspicious_channels_xx.dat	Large RMS anywhere
- bad_channels_chisqxx.dat	Large chi-square
- bad_channels_entriesxx.dat	Missing Entries
- bad_channels_dataxx.dat	Missing Calibration Points

- These files contain :

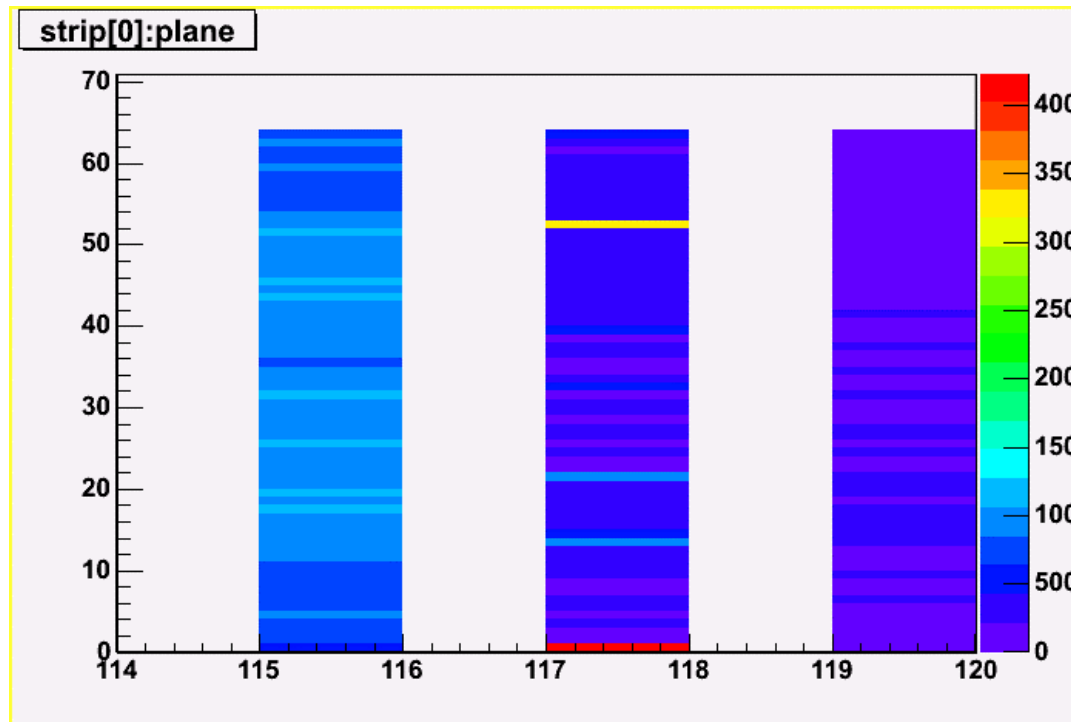
- master
- minder channel
- master channel
- crate
- module
- Strip & Plane
- DAC value
- **PATHOLOGY RELATED INFO (rms, chi-square, entries, calibration points)**

Null Trigger Runs

- With Null Trigger Runs (light ON-OFF) we can check (using output tree from Peters bootleg code) :
 - If there are any dead strips, dead planes (!), holes in the readout “chain”
 - Light leaks in Scintillator Plane (usually should appear as a high rate in a particular strip **that CHANGES with lights ON lights OFF**)
 - Light leaks on the connectors (usually should appear as high rate for a particular group of strips corresponding to the particular connector **that CHANGES with lights ON lights OFF**)
 - Light leaks on the LI system (usually should appear as a high rate affecting the hole plane with maybe a similar pattern for different planes **that CHANGES with lights ON lights OFF**)
 - Problems with the PMT’s (should appear as a higher rate or strange strip occupancy that **DOES NOT CHANGE with lights ON lights OFF**)
 - **Other Problems that we have not seen yet...**

Null Trigger Runs: Dead strips, planes, holes in readout chain

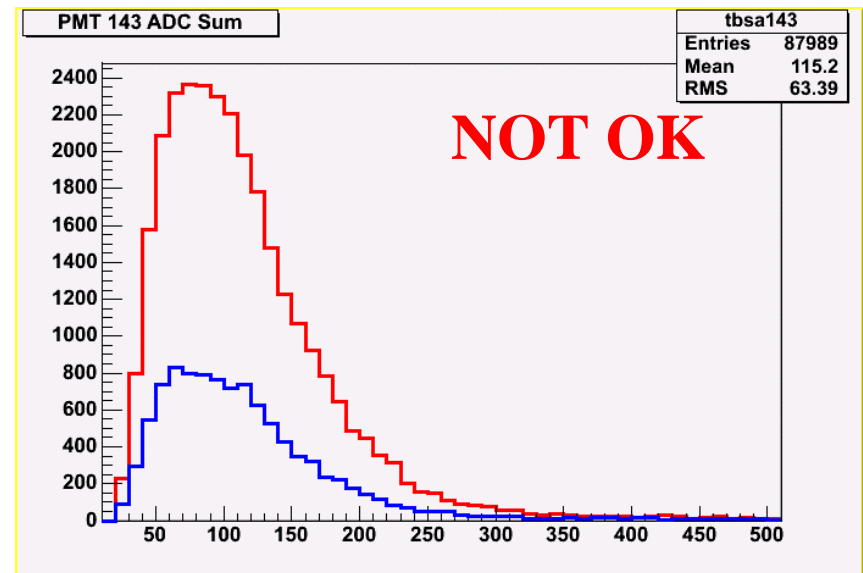
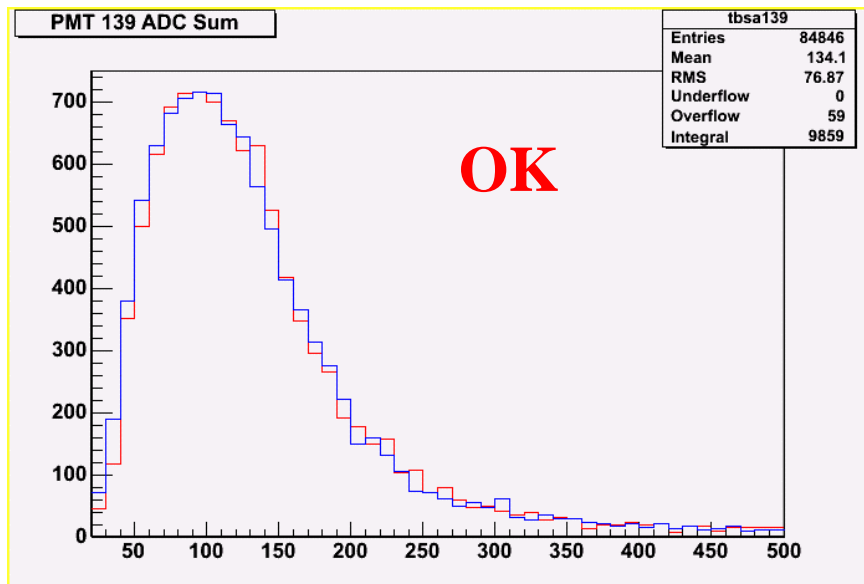
- Check if there are any dead strips, dead planes (!), or wholes in the readout “chain” by looking at the strip vs plane plots



If there were strip with no entries at all, that would be a problem

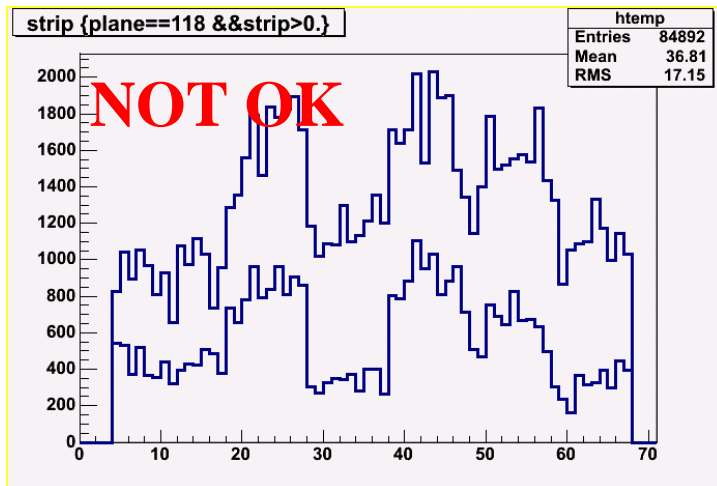
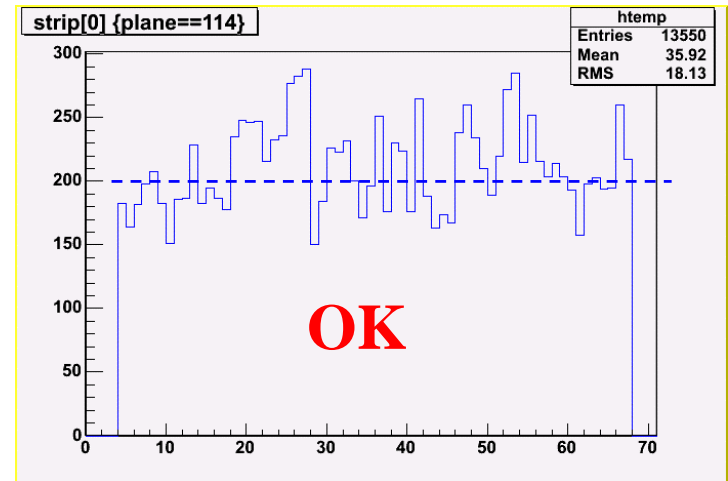
Null Trigger Runs: Light Leaks

- Check if there are any light leaks by comparing ADC distribution of each PMT with lights ON - OFF

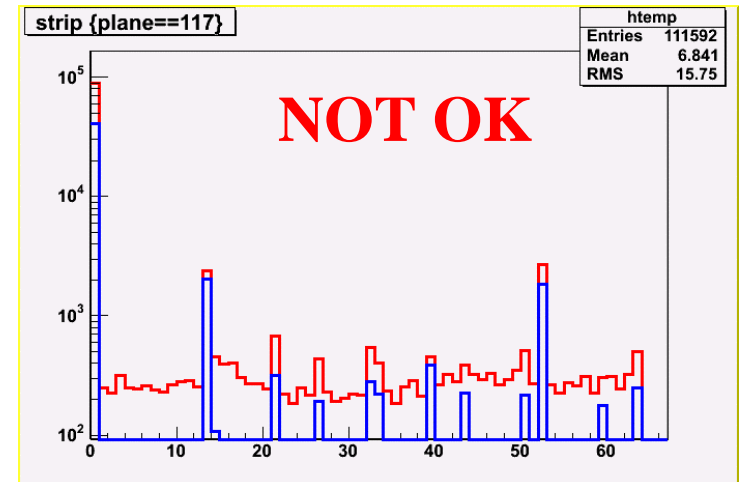


Null Trigger Runs: Light Leaks cont'd

- If a light leak is found check strip vs plane distribution to see if:
 - 1) All strips (or groups of strips) are ~ equally affected
 - 2) A particular strip (or isolated strips) are affected.

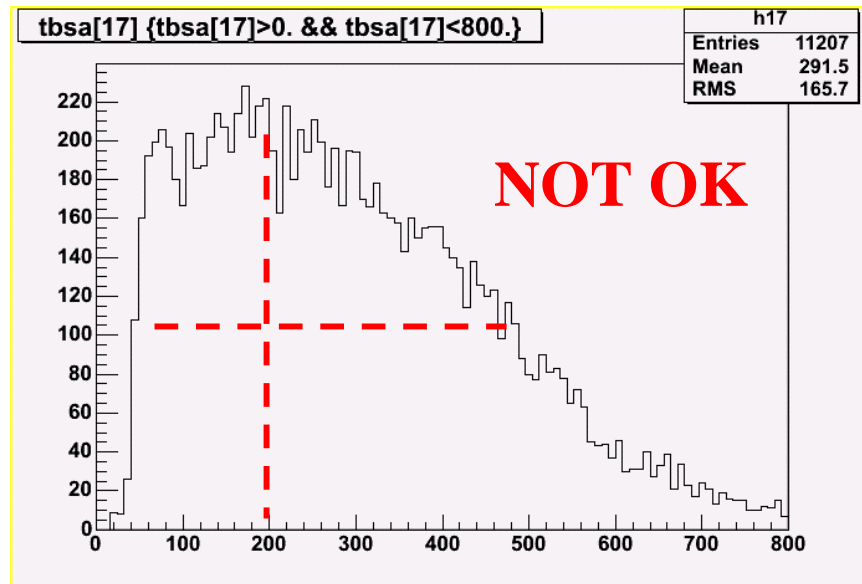
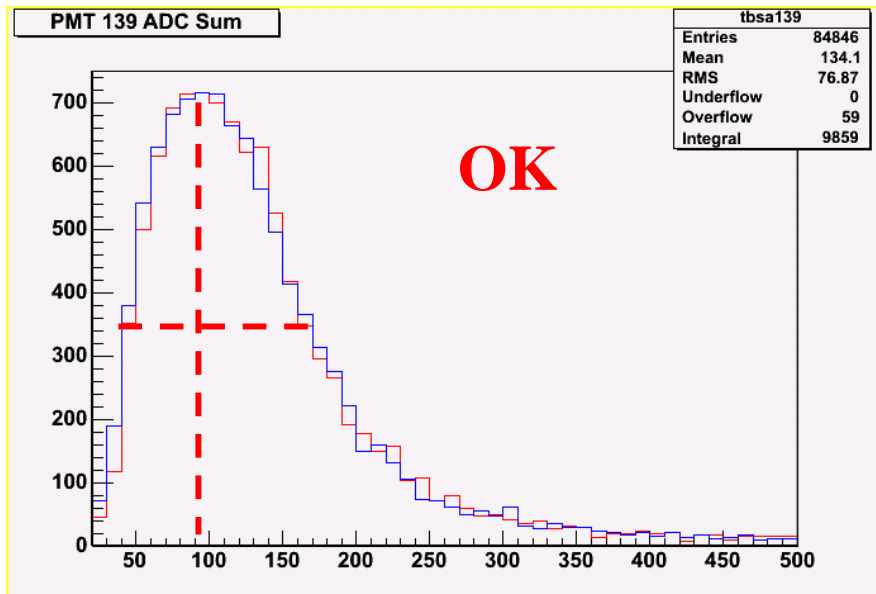


PROBLEM with LI SYSTEM



BAD PMT

Null Trigger Runs: PMT sanity



A “normal” PMT should have :

- MEAN (for singles) : ~ 100 ADC counts (80-120 ADC counts)
- SIGMA : ~ 50 ADC counts
- RATE \gg : $\sim 1\text{KHz}$ (0.8-1.4KHz)

Summary

- Looking at :

(A)

- RMS of Pedestals
- QIE text files with
 - RMS of QIE in NCC runs
 - Linearity
 - Missing Entries
 - Missing points

(B)

- STRIP vs PLANE distribution (occupancy plot)
- PMT ADC distributions with lights ON-OFF
- STRIP occupancy plots

we can detect and correct on a **daily basis** pathologies related with our electronics, the scintillator planes and the PMT's and thus check the integrity of the entire detector as the installation progresses .

- On a weekly basis it would be useful (and necessary) to test the stability of the pedestals, the electronics and the PMT's as a function of time.